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THE SCIENTIFIC NAME OF THE COMMON BLUE MUD-DAUBER (HYMENOPTERA, SPHECIDAE)

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The common blue mud-dauber of the United States and Canada is generally known as either *Chalybion caeruleum* Linnaeus or *Chalybion cyaneum* Fabricius (or Klug or Dahlbom). Both names are incorrect. This wasp was first described as *Sphex caerulea* by Johansson or Linnaeus in 1763 (Amoenitates Academicæ, VI, p. 412). Subsequently in 1767, Linnaeus listed it as the second species of *Sphex* in the twelfth edition of his *Systema Naturæ*. But as Fernald has shown in discussing the nomenclatorial history of *Chlorion cyaneum* Dahlbom, 1843*, *Sphex caerulea* Johansson (or Linnaeus), 1763, a Nearctic form originally described from Philadelphia, is a homonym of *Sphex caerulea* Linnaeus, 1758, a South American species, which Linnaeus also lists in the twelfth edition as the thirty-eighth species of *Sphex*. Thus the common Nearctic *Chalybion* cannot be called *caeruleum*. Apparently aware of this, Fabricius renamed the species *Sphex cyanea* in 1775 (Syst. Ent., p. 346), and it was upon this name that Dahlbom in 1843 based his *Chalybion cyaneum*. But bibliographers and investigators alike have overlooked the fact that *Sphex cyanea* Fabricius, 1775, is a homonym of *Sphex cyanea* Linnaeus, 1758 [= *Chrysis* (*Trichrysis*) *cyanea* (L.)]. Thus Fabricius' name *cyanea* cannot be applied to the common Nearctic *Chalybion*, and another name must be found for this mud-dauber.

In addition to *caerulea* Johansson (or Linnaeus), 1763, and *cyanea* Fabricius, 1775, three other specific names have been applied to Nearctic *Chalybia*: *Chalybion Zimmermanni* Dahlbom, 1843; *Pelopeus* (*Chalybion*) *californicus* Saussure, 1867; and *Pelopoeus texanus* Cresson, 1872. Under the generic name *Sceliphron*, Dalla Torre in his *Catalogus Hymenopterorum* lists the last three as distinct species and records the present form as *Sceliphron caeruleum* Linnaeus, 1758, but under that name has confused several different species: *Sphex caerulea* Linnaeus, 1758 (Syst. Nat., Ed. X, p. 571, no. 22), a South American form probably referable to *Pepsis*; *Sphex caerulea* Linnaeus (or Johansson), 1763 (Amoen. Acad., VI, p. 412, no. 90), the present Nearctic species; and *Sphex caeruleana* Drury, 1773 (Ill. Nat. Hist. Ex. Ins., II, p. 74, pl. 39 fig. 4), an African form described from the Bight of Benin. Curiously enough, however, Dalla Torre does not list *Sphex caerulea* Drury, 1773 (Ill. Nat. Hist., Ex. Ins., II, p. 75, pl. 39, fig. 8), which Drury evidently meant to apply to the present Nearctic blue mud-dauber since he lists it from New York, but for which he gives the bibliographic citation: [Linnaeus, Syst. Nat., Ed. XII, p.] 947, no. 38—the wrong *caerulea*, i. e. *Sphex caerulea* Linnaeus, 1758.

In 1919, Hutson presented a review of the North American species of *Chalybion* under the generic name *Sceliphron*†. Two species were recognized as valid: *Sceliphron* [i. e. *Chalybion*] *Zimmermanni* Dahlbom, 1843, of which *Pelopoeus texanus* Cresson, 1872, was recorded as a synonym, and *Sceliphron cyaneum* Klug, 1801. But from the bibliographic citations given by Klug,

*Ent. News, XV, pp. 177-120, (1904). *V. et. Ann. Ent. Soc. Amer.*, XXIV, pp. 439-440; 450, (1931).

†Hutson, J. C. The North American species of the genus *Sceliphron*. *Trans. Amer. Ent. Soc.*, XLV, pp. 203-227, (1919).

it is obvious that his *cyaneum* is referable to *Sphex cyanea* Fabricius, 1775, and *Sphex caerulea* Johansson (or Linnaeus), 1763. As a synonym of *Sceliphron cyaneum* Klug (i. e. *Chalybion cyaneum* (Fabricius), 1775), Hutson lists *Pelopeus* (*Chalybion*) *californicus* Saussure, 1867, and, since I have been unable to find in the literature any other name earlier than Saussure's which may properly be applied to the present species, our common blue mud-dauber must henceforth be known as *Chalybion californicum* (Saussure).

The pertinent synonymy of the present species follows:

***Chalybion californicum* (Saussure)**

1763. *Sphex caerulea* Johansson & Linnaeus, *Amoenitates Academicæ*, VI, p. 412, no. 90; [not Linnaeus, 1758]. (Habitat in Philadelphia.)
1767. *Sphex caerulea* Linnaeus, *Syst. Nat.*, Ed. XII, p. 941, no. 2; [not Linnaeus, 1758]. (Habitat in America septentrionali.)
1773. *Sphex caerulea* Linnaeus: DeGeer, *Mem. Hist. Insect.*, III, p. 589, no. 6, tab. 30, fig. 6; [not Linnaeus, 1758]. (Pennsylvanie.)
1775. *Sphex cyanea* Fabricius, *Syst. Ent.*, p. 346, no. 5; [new name for *Sphex caerulea* Johansson & Linnaeus, 1763; but not *Sphex cyanea* Linnaeus, 1758=*Chrysis cyanea* (L.)]. (Habitat in America septentrionali.)
1781. *Sphex cyanea* Fabricius, *Spec. Insect.*, p. 443, no. 6; [not Linnaeus, 1758]. (Habitat in America boreali.)
1793. *Sphex cyanea* Fabricius, *Entom. Syst.*, II, p. 201, no. 13; [not Linnaeus, 1758].
1801. *Sceliphron cyaneum* [Fabricius]: Klug, *Neu. Schrift. Ges. naturf. Berlin*, III, p. 566, no. 4; [not Linnaeus, 1758]. (Das Vaterland ist nordamerika.)
1805. *Pepsis cyanea* Fabricius, *Syst. Piez.*, p. 211, no. 17. (Habitat in America boreali.)
1843. *Chalybion cyaneum* Fabricius: Dahlbom, *Hymen. Europ.*, I, p. 22, no. 3; [not Linnaeus, 1758]. (Habitat Americæ utriusque frequens.)
1845. *Pelopaëus caeruleus* Linnaeus: Lepeletier, *Hist. Nat. Hymen.*, III, p. 320, no. 20; [not Linnaeus, 1758]. (Caroline.) [Confused with the following; bibliographic citation essentially same for both.]
1845. *Sphex cyanea* Fabricius: Lepeletier, *Hist. Nat. Hymen.*, III, p. 336, no. 4; [not Linnaeus, 1758]. (Philadelphie.) [Confused with the preceding; bibliographic citations essentially same for both.]
1867. *Pelopeus* (*Chalybion*) *coeruleus* Linnaeus: Saussure, *Reise d. Novara, Zool.*, II, p. 26, no. 1; [not Linnaeus, 1758]. (♀, ♂; America septentrionalis, Mexico temperata.)
1867. *Pelopeus* (*Chalybion*) *californicus* Saussure, *Reise d. Novara, Zool.*, II, p. 26, no. 3. (♀, ♂; California.)
1919. *Sceliphron cyaneum* Klug [i. e. Fabricius, 1775 *nec* Linnaeus, 1758]: Hutson, *Trans. Amer. Ent. Soc.*, XLV, p. 219.
- (1918?) *Sceliphron* (*Chalybion*) *coeruleum* Linnaeus: Kohl, *Ann. K. K. Naturhist. Hofmus. Wien*, XXXII, p. 57, (1919?). [= *Sphex caerulea* Linnaeus (or Johansson), 1763, *nec* Linnaeus, 1758. Synonymy confused and evidently merely quoted from Dalla Torre, *Catal. Hymen.*, VIII, p. 381-382, (1897).]

As noted above, the original material upon which Johansson (or Linnaeus) based *Sphex caerulea*, 1763, came from Philadelphia. The only locality data given in connection with *Pelopeus californicum* Saussure, 1867, is merely "California". Saussure's types, which are probably at Geneva, apparently have not been examined by any subsequent investigator (Fernald, Kohl, Hutson, Schulz, etc.), and consequently the above synonymy is entirely dependent upon an eventual study of Saussure's types and comparison of them with material from the eastern United States. However, Hutson was unable to find any tangible external characters wherein the eastern specimens of the present species differed from California material. I have examined the male genitalia of specimens from various localities in California and find no essential difference from those from various places in the east. Consequently, at the present juncture, I believe the above synonymy to be correct and see no course but to employ Saussure's name *californicum* for the common blue mud-dauber.

The male genitalia of *Chalybion zimmermanni* Dahlbom (in the present accepted sense) have also been examined and found to be quite distinct from those of *californicum*, thus removing Dahlbom's name as a possible one which might be applied to the present species.

HOST PLANTS AND PARASITES OF SOME LEPIDOPTEROUS LARVAE*

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A list† of the host plants and parasites of lepidopterous larvae reared during a study of the native hosts of parasites of the oriental fruit moth, *Grapholitha molesta* Busck, was published in 1935. Much additional data which have since accumulated appear worth placing on record, particularly the host relations of the parasites. Information on larval habits, etc., given in the previous paper will not be repeated here. Determinations were made by the specialists of the Division of Entomology, Ottawa: Lepidoptera by Dr. J. H. McDunnough and Mr. T. N. Freeman; Ichneumonidea by Mr. G. S. Walley; Chalcidoidea by Dr. O. Peck; and Diptera by Mr. A. Brooks. The co-operation given by these gentlemen has been much appreciated. Thanks are also due to Mr. E. W. Hart of the Division of Botany and Plant Pathology for the determination of some *Aster* and *Solidago* species.

The numbers of the Lepidoptera follow those of Dr. McDunnough's 1938-1939 Check List. Botanical nomenclature is that of Gray's Manual, Seventh Edition. Unless otherwise stated, all collections were made in the vicinity of Vineland Station, Ontario. The dates refer to the emergence of adults.

PHALAEINIDAE

- 2711 *Achatodes zeae* Harr. July 24, 1936. In twigs of *Sambucus nigra*.
3235 *Sarothripus revayana* Scop. July 14-24, 1936 and 1940. Young larvae colonial, webbing terminal shoots of *Salix* and *Populus* spp. Parasites: *Diocetes obliterated* (Cress.), July 17, 1936.
3807 *Palthis angulalis* Hbn. August 4, 1938. On *Spiraea van houttei*.

PYRALIDAE

- 5355 *Desmia funeralis* Hbn. June 21-July 3, 1937. On *Psedera quinquefolia*.
5397 *Pantographa limata* G. & R. July 10-26, 1936 and 1940. On *Tilia americana*. Parasites: *Phorocera erecta* Coq., July 19-21, 1940.
5448 *Grocidophora serratissimalis* Zell. July 5-9, 1938. Larva on *Leersia oryzoides* and *L. virginica*, within a tube formed by sewing together the edges of a leaf.
5479 *Loxostege commixtalis* Wlk. June 30, 1936. On *Aster novae-angliae*.
5563 *Phlyctaenia helvalis* Wlk. August 9 and 10, 1936. Leaf roller on *Populus tremuloides*.
5564 *Phlyctaenia tertialis* Gn. July 11, 1938. Larvae webbing leaves of *Sambucus canadensis*.
5576 *Pyrausta pertextalis* Led. Beamsville and Vineland Station, June 28-July 9, 1937, 1938 and 1941. Larvae rolling leaves of *Aster* spp., *Viola* spp., and apparently other low plants. Parasites: *Campoplex militaris* Vier., July 7, 1941; *Phorocera erecta* Coq., July 4-8, 1941.
5601 *Pyrausta futilalis* Led. August 2-5, 1935. Larvae colonial in younger stages, in a web on *Apocynum androsaemifolium*.
5625 *Pyrausta ochosalis* Dyar. July 17, 1936. Webbing leaves of *Mentha piperita*.
5633 *Pyrausta signatalis* Wlk. July 13, 1938. Leaf roller on *Monarda mollis*.
6079 *Acrobasis kearfottella* Dyar. Parasite: *Scambus indagator* (Cress.), July 4, 1941.
6082 *Acrobasis juglandis* Le Bar. July 3-22, 1940 and 1941. Larva in tapering case on petiole of *Juglans nigra*. Parasite: *Scambus indagator* (Cress.), June 29, 1941.

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†Can. Ent. 67:105-109. 1935.

- 6094 *Acrobasis sylvicola* Ely. July 14-25, 1940. Parasites: *Exochus apicalis* Cress., July 19-31, 1940; *Meteorus indagator* (Riley), July 6-8, 1940; *Hyposoter comptoniellae* Vier., July 1-13, 1940.
- 6100 *Acrobasis caryae* Grt. July 9, 1935 and 1937. Larvae boring in bases of young twigs of *Carya cordiformis*; a small tubular case over the entrance.
- 6115 *Mineola indigenella* Zell. July 18-20, 1938. Larva in long, tortuous case on twigs of *Prunus americana*.
- 6184 *Meroptera pravella* Grt. June 5-29, 1936. Leaf roller on *Populus tremuloides*.
- 6205 *Salebria virgatella* Clem. June 23, 1936. Leaf roller on *Robinia Pseudo-Acacia*.
- 6372 *Homoeosoma reliquellum* Dyar. June 8-10, 1937. Larvae in flower heads of *Aster novae-angliae*.

PTEROPHORIDAE

- 6561 *Oidaematophorus homodactylus* Wlk. July 6-20, 1935. On *Solidago altissima*.
- 6568 *Oidaematophorus lacteodactylus* form *kellicottii* Fish. June 11-26, 1936. Boring in bases of stems and rhizomes of *Aster paniculatus*.

OLETHREUTIDAE

- 6592 *Episimus argutatus* Clem. First brood, May 29-June 23; second brood, August 1-17; 1934, 1936 and 1939. On *Rhus typhina*, *R. toxicodendron* and *R. cotinus*. Parasites: *Symphiesis dolichogaster* Ashm., August 29, 1936; *Exochus dorsalis* Cress., August 15-22, 1939; *Diocetes obliterated* (Cress.), August 4, 1939; *Meteorus trachynotus* Vier., July 31-August 7, 1939; *Bassus calcaratus* (Cress.), August 15-25, 1939; *Phorocera erecta* Coq., August 6-9, 1939; *Perilampus fulvicornis* Ashm., a hyperparasite emerging from isolated cocoons of *Meteorus trachynotus*, August 15-25, 1939.
- 6613 *Polychrosis slingerlandana* Kft. June 23-July 3, 1937. In inflorescence of *Eupatorium purpureum*.
- 6629 *Endothenia antiquana* Hbn. June 14-July 15, 1938. Boring in bases of stems of *Stachys palustris*. Emerging from the same material were a few specimens of another *Endothenia*, tentatively placed by Dr. McDunnough as near *montanana* Kft.
- 6656 *Phaenocarpa niveiguttana* Grt. St. Davids, June 4-13, 1936. Leaf roller on *Sassafras variifolium*. Parasite: *Microgaster ecdytolophae* Meus., October 6, 1935.
- 6670 *Exartema punctatum* Wlsh. (= *cornanum* of previous paper). Parasite: *Hypopteromalus inimicus* Mues., St. Davids, June 29, 1934.
- 6671 *Exartema connectum* McD. July 3-17, 1936. On *Cornus paniculata*.
- 6672 *Exartema inornatum* Clem. Parasite: *Microgaster canadensis* Mues., Vineland Station, June 14-July 8, 1938.
- 6679 *Exartema tilianum* Heinr. June 28-July 5, 1941. On *Tilia americana*.
- 6685 *Exartema merrickanum* Kft. In addition to *Hamamelis*, this species has also been reared from *Ostrya virginiana*, June 20-22, 1938.
- 6715 *Olethreutes agilana* Clem. June 24-July 21, 1936. In stems of *Impatiens biflora*.
- 6743 *Evora hemidesma* Zell. August 21-Sept. 8, 1938. Leaf roller on *Spiraea van houttei*.
- 6744 *Pseudogalleria inimicella* Zell. June 7-14, 1936. In bases of stems of *Smilax herbacea*.
- 6772 *Thiodia essexana* Kft. St. Davids, June 6-29, 1935; Vineland Station, June 24-28, 1937. Boring in stems of *Aster novae-angliae*. The larvae of

this and all the following species of *Thiodia* leave their feeding quarters and overwinter as mature larvae in cocoons spun in the soil or among debris, pupating the following spring or summer.

- 6778 *Thiodia formosana* Clem. St. Davids, July 1 and 2, 1935; Vineland Station, June 24, 1937. Larva in a case formed of the terminal leaves of *Solidago altissima*, and boring in the apex of the stem. From one of the same collections a closely related form, probably *ferruginana* Fern., emerged on June 17, 1937; apparently more than one species have larval habits of this type.
- 6787 *Thiodia ochroterminana* Kft. August 19-24, 1935. Larva on *Solidago altissima*, webbing together several flower heads and feeding inside.
- 6788 *Thiodia perfusca* Heinr. July 8, 1935. In flower heads of *Aster macrophyllus*.
- 6790 *Thiodia alterana* Heinr. July 22–August 25, 1936 and 1937. In flower heads of *Aster macrophyllus* and *A. paniculatus*.
- 6794 *Thiodia tomonana* Kft. August 24, 1935; August 23, 1937. In flower heads of *Aster novae-angliae*.
- 6808 *Thiodia ornatula* Heinr. July 23-26, 1937. In flower heads of *Lactuca spicata*.
- 6972 *Eucosma dorsisignatana* form *similana* Clem. August 25–Sept. 7, 1936. In rhizomes of *Solidago altissima*.
- 6982 *Eucosma sombreana* Kft. July 22, 1936. In bases of stems of *Helianthus* sp. Small lepidopterous larvae were present in the flower heads in August, whereas *sombreana* could not be found boring in the stems until some time later. The identity of the larvae in the flowers was not established by rearing, but may possibly have been *E. sombreana*, the larvae not entering the stems until after they have fed for some time in the flowers, as in the case of *Epiblema carolinana**.
- 7004 *Eucosma cataclystiana* Wlk. August 14, 1936. Boring in the bases of stems and in rhizomes of *Solidago graminifolia*.
- 7014 *Epiblema strenuana* Wlk. Moths that appeared to be identical in every respect with this common ragweed borer were reared from larvae in the stems of *Xanthium* sp. on August 19–Sept. 3, 1936. The parasites, *Cremastus minor* Cush. and *Bassus simillimus* (Cress.) recovered from the *Xanthium* material are both common on the ragweed borer.
- 7027 *Epiblema scudderiana* Clem. June 1–July 4, 1935. In a fusiform gall on stems of *Solidago altissima*; by far the most abundant lepidopterous goldenrod gall-maker in the vicinity of Vineland Station. Parasites: *Apanteles cacoeciae* Riley, June 1-3, 1935; *Glypta rufiscutellaris* Cress., Sept. 13, 1934; *Bassus simillimus* (Cress.), July 2, 1935; *Epiurus pterophori* Ashm., May 31, 1935.
- 7030 *Epiblema obfusca* Dyar. June 7–July 10, 1935 and 1936. The young larva enters the stem of *Solidago altissima* a few inches below the tip, and by tunnelling horizontally about the stem, girdles it and causes the death of the upper part. The larva then tunnels slowly down to the base where it overwinters below the level of the soil. All *Epiblema* species reared hibernated as mature larvae within their feeding tunnels. Parasites: *Bassus simillimus* (Cress.), June 28 and 29, 1935; July 1, 1936; *Macrocentrus pallisteri* De Gant, June 29, 1935; *Glypta rufiscutellaris* Cress., June 15, 1936.
- 7032 *Epiblema carolinana* Wlshm. July 18–August 29, 1936. In bases of stems of *Rudbeckia laciniata*.
- 7044 *Epiblema otiosana* Clem. This well-known borer in *Bidens* was reared from stems of *Ambrosia artemisiifolia*, July 3, 1936.

*Thompson, R. W. 1928. 58th Annu. Rept. Ent. Soc. Ont. pp. 73-75.

- 7053 *Suleima cinerodorsana* Heinr. July 20—August 25, 1936 and 1937. In stems of *Helianthus* sp.
- 7055 *Sonia canadana* McD. July 9—August 24, 1936. In underground parts of stems of *Aster novae-angliae*.
- *Pseudexentera caryana* McD. April 14-18, 1938. Leaf roller on *Carya ovata*, maturing in June and entering the soil to spin up.
- 7158 *Epinotia acciella* Clem. May 23-25, 1936. Larva within a tube, skeletonizing the under surface of leaves of *Acer saccharum*. In rearing cages they spun oval cocoons between fallen leaves and pupated in autumn.
- 7161 *Epinotia nanana* Tr. Spruce Needle Miner. June 19—July 10, 1935. Very common on *Picea Abies*. Parasite: *Hypopteromalus inimicus* Meus., May 1-10, 1935.
- 7172 *Epinotia lindana* Fern. August 24, 1938. Leaf roller on *Cornus paniculata*.
- 7183 *Anchylopera spireaefolia* Clem. July 29—August 20, 1935 and 1938. The larvae fold the leaves or tie pleats between the lobes. Parasite: *Dioctes obliteratus* Cress., July 30—August 2, 1935.
- 7196 *Ancylis muricana* Wlshm. Adults of this species, always in very small numbers, emerged from collections of cultivated strawberry leaves infested with the strawberry leaf roller, *Ancylis comptana* Froel., May 25-31, 1935; August 6, 1936.
- 7223 *Dichrorampha bittana* Busck. June 17-27, 1936. Larvae feeding in or on the rhizomes of *Aster paniculatus*.
- 7244 *Grapholitha packardii* Zell. July 18—August 6, 1936; August 12-27, 1937. Boring in tips of shoots and in buds of cultivated roses.
- 7300 *Melissopus latiferreanus* Wlshm. June 1—July 22, 1935. In acorns of *Quercus rubra*. Parasite: *Glypta rufiscutellaris* Cress., June 28, 1935.
- 7304 *Ecdytolopha insiticiana* Zell. July 16-29, 1940. In twigs of *Robinia pseudo-Acacia*. Parasites: *Microgaster ecdytolophae* Mues., June 18 and 19, 1940; *Perilampus fulvicornis* Ashm., July 15-19, 1940.

TORTRICIDAE

- 7317 *Sparganothis pettitana* Rob. Parasites: *Dimmockia incongrua* (Ashm.), St. Davids, June 23, 1934.
- *Sparganothis putmanana* Freeman. St. Davids, June 19—July 7, 1932, 1934, 1937. Leaf roller on *Solidago altissima*, *Aster novae-angliae* and other sp., *Rosa blanda*, *Prunus serotina*, *Rubus* spp. and *Quercus rubra*. Parasites: *Cremastus epagoges* Cush., June 19-25, 1934.
- 7369 *Platynota idaeusalis* Wlk. July 4, 1935. Leaf roller on *Rubus strigosus*.
- 7383 *Archips fervidana* Clem. June 29—July 9, 1938. Larvae colonial, in a nest similar to that of *Achips cerasivorana*, on *Quercus rubra*. Appears to be very scarce in the Niagara Peninsula.
- 7398 *Archips rosana* Linn. Very abundant on a privet hedge in Vineland for several years; also on *Caragana arborescens*. Parasites: *Microgaster canadensis* Mues., July 2-5, 1935; July 6, 1940; *Zenillia caesar* Ald., July 8 and 9, 1940; *Phorocera erecta* Coq., July 13-15, 1940.
- 7399 *Archips purpurana* Clem. Parasites: *Macrocentrus nigradorsis* Vier., July 5-9, 1938; *Oncophanes atriceps* (Ashm.), June 25, 1938; *Microgaster canadensis* Mues., June 14—July 8, 1938.
- 7516 *Peronea cornana* McD. August 13, 1938; June 26—July 2, 1939. On *Cornus paniculata*.

PHALONIIDAE

- 7558 *Phalonia bunteana* Rob. July 21-24, 1936. In flower heads of *Lactuca spicata*.

- 7562 *Phalonia marloffiana* Busck. August 14-27, 1937. In flower heads of *Aster novae-angliae*.
7567 *Phalonia oenotherana* Riley. August 1-Sept. 9, 1935 and 1939. In flower buds of *Oenothera biennis*.

CARPOSINIDAE

- 7627 *Carposina fernaldana* Busck. August 11-Sept. 1, 1937. In fruit of *Crataegus* spp.

COSMOPTERYGIDAE

- 7749 *Mompha stellella* Busck. Sept. 9-16, 1935. In flower buds of *Oenothera biennis*.

GELECHIIDAE

- 7898 *Recurvaria nanella* Hbn. July 6-13, 1936. On apple, with a collection of *Spilonota ocellana* D. & S.
8089 *Gelechia vernella* Murt. St. Davids and Vineland Station, June 22-July 8, 1935 and 1938. Tying leaves of *Quercus rubra* and *Quercus alba*. Parasite: *Asphragis mirabilis* (Cress.), July 8-12, 1937; July 5 and 6, 1938.
8153 *Gnorimoschema gallaesolidaginis* Riley. August 11-Sept. 18, 1936. In gall on stem of *Solidago altissima*; generally uncommon locally. Parasites: *Copidosoma gelechiae* Haw., Sept. 9, 1936; *Sesioplex depressus* Vier., May 26-June 1, 1937.
8284 *Onebala alacella* Clem. July 6-12, 1935-1937. Folding over the margin of a leaf on *Solidago altissima*, *Aster cordifolius* and *A. paniculatus*. Parasite: *Lissonota marginata* (Prov.), July 3, 1937.
8319 *Trichotaphe flavocostella* Clem. Parasite: *Lissonota marginata* (Prov.), June 27-July 5, 1937.
8331 *Trichotaphe levisella* Fyles. July 1-7, 1937. Folding over the margin of a leaf on *Aster paniculatus* and *A. cordifolius*.

OECOPHORIDAE

- 8383 *Machimia tentoriferella* Clem. August 24-Sept. 23, 1935 and 1937. On *Robinia Pseudo-Acacia*, *Tilia americana* and *Cornus paniculata*, beneath a web across the underside of a leaf.
8448 *Agonopterix robiniella* Pack. July 2-5, 1938. Leaf roller on *Robinia Pseudo-Acacia*.

AEGERIIDAE

- 8755 *Synanthedon pyralidiformis* Wlk. July 22-August 2, 1936. In bases of stems of *Eupatorium perfoliatum*.

PLUTELLIDAE

- 8866 *Acrolepia incertella* Cham. April 14-16, 1938. Larvae boring into fruit of *Smilax herbacea*, overwintering as pupae in lace cocoons on the pedicels.
8870 *Plutella porrectella* Linn. May 23-June 15, 1936. Webbing young shoots of *Hesperis matronalis*.

YPONOMEUTIDAE

- 8931 *Yponomeuta multipunctella* Clem. July 8-17, 1935 and 1940. In a loose web on *Evonymus obovatus*. Parasite: *Nemorilla maculosa* Meig., July 13, 1940.

GRACILLARIIDAE

- 9361 *Gracillaria burgessiella* Zell. Two broods; June 2, August 2-26, 1935, 1936, 1938. Leaf roller on *Cornus paniculata*. Parasite: *Apanteles ornigis* Weed, Sept. 16, 1935; June 2-7, 1936.
9375 *Gracillaria stigmatella* Fabr. Sept. 23, 1935. On *Populus tremuloides*.
9398 *Gracillaria cuculipennella* Hbn. July 15-18, 1940. On *Fraxinus americana*.

LYONETHIDAE

- 9429 *Buccatrix magnella* Cham. July 12-16, 1935. Larvae boring into the terminal buds on stems of *Solidago altissima*.

PRODOXIDAE

- 9823 *Prodoxus quinquepunctellus* Cham. July 9-23, 1936. Larvae in flower stalks of *Yucca filamentosa*; adults are often very numerous within the flowers.
- 9834 *Tegeticula alba* Zell. July 29, 1940. Larvae in seed capsules of *Yucca filamentosa*. Much less common than *Prodoxus*.

TWO UNDESCRIBED CANADIAN MICROLEPIDOPTERA*

BY J. McDUNNOUGH,

Ottawa, Ont.

Elachista maritimella n. sp.

Venation as in Meyrick's figure (Handbook Brit. Lep. 712) except that on primaries vein 9 is connate with the stalk of 6-8 from apex of cell. Unicolorous light ochre-yellow. Head and palpi somewhat paler than forewings. Antennae faintly smoky with traces of brown annulations. In well marked specimens the forewings show the merest traces of irregular, whitish, median and subterminal bands. Secondaries pale smoky. Fringes on both wings light yellowish. Abdomen yellowish, including anal tuft. Traces of smoky shadings on pectus and basal portions of legs. Expanse 9-10 mm.

Holotype—♂, Bathurst, N. B., June 24, 1941, (J. McDunnough); No. 5269 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, June 26.

Paratypes—9 ♂, 1 ♀, same data (J. McDunnough and T. N. Freeman).

The series was taken on the salt coastal meadows a few miles north of Bathurst. I can find no description of any North American species which would fit our specimens but the species would seem (following Meyrick's key) to be allied to the European *subalbidella* Schlag.

Scythris epilobiella n. sp.

Head, thorax, legs and primaries deep black, the latter with light sprinkling of white scaling and traces of darker black longitudinal streaks through the cell and along the fold. Secondaries deep smoky. Fringes on both wings blackish. Abdomen dorsally in male paler than forewings, with a somewhat purplish-gray tinge, in female blackish; ventrally in both sexes a strong median suffusion of white scaling, which includes the anal tufting. In the male genitalia the clasper terminates in a long, upturned prong, cephalad of which is a shorter, stouter hook; the aedeagus is a long, thin, slightly curved rod, arising from a bulbous base. Expanse 15-17 mm.

Holotype—♂, Alberton, P. E. I., Aug. 2, 1940, (J. McDunnough) (Bred from *Epilobium*); No. 5270 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—4 ♂, 5 ♀, same data, Aug. 2-7; 5 ♂, Eel River, N. B., July 26, 1941, (T. N. Freeman) (On *Epilobium*).

Larvae of the species were common in both localities, tying up the flower-heads of *Epilobium* into unsightly webs containing a number of larvae. They were heavily parasitized by a tachinid fly of the genus *Psilidopteryx*, probably undescribed, according to A. R. Brooks. Adult specimens submitted to the United States National Museum could not be determined by J. F. Gates Clarke.

*Contribution No. 2190, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

NOTES ON THE LIFE HISTORIES OF FIVE COMMON GEOMETRIDAE

BY V. G. DETHIER,

John Carroll University, Cleveland, Ohio

Although larvae of the five species described below are among those loopers most frequently encountered in numbers, complete data on their life histories are still lacking. The following notes, based on large samples of larvae collected and bred in New England during the past three years, are intended to supplement the accounts of earlier authors and are not in themselves complete.

***Cosymbia pendulinaria* Gn.**

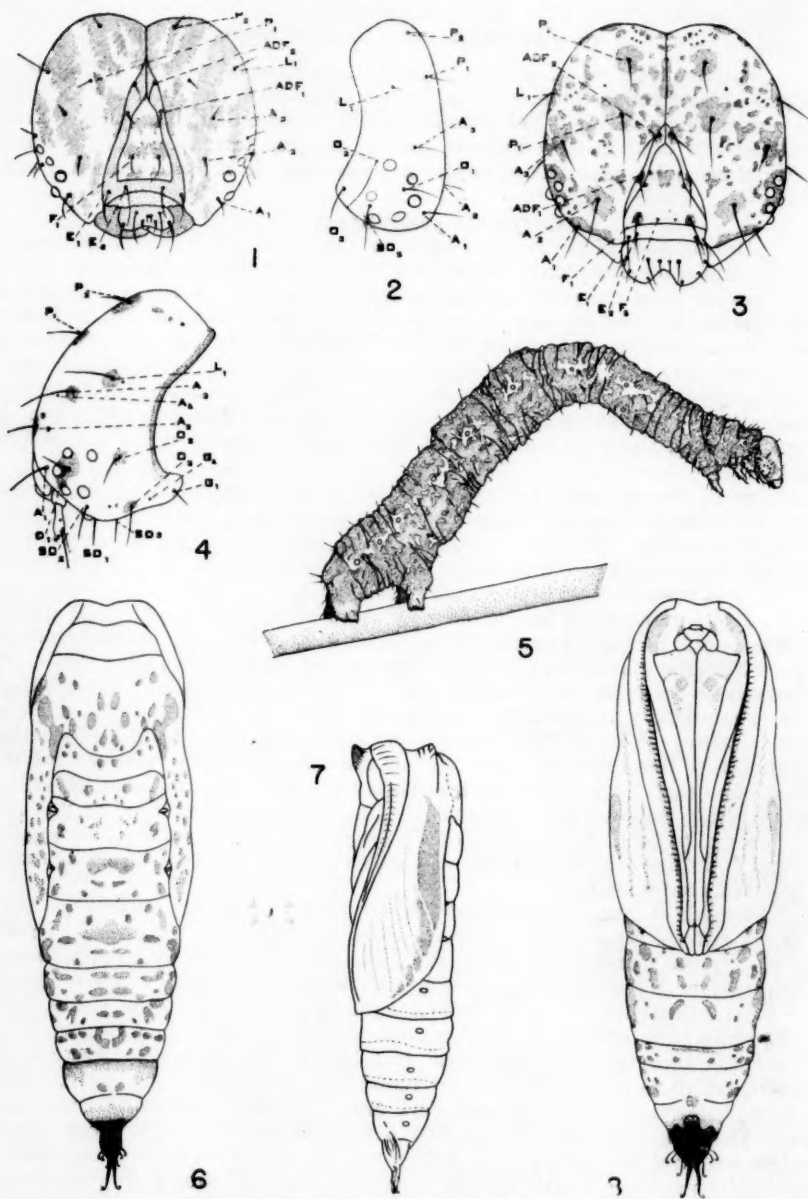
During most of the summer larvae of *Cosymbia pendulinaria* are exceedingly common on *Comptonia asplenifolia* Ait. throughout New England. Sweet fern appears to be the preferred food plant, but species of *Betula*, *Vaccinium*, and *Psoralea* are also reported as acceptable. Larvae of the first brood mature early in the summer and pupate toward the end of July, emerging about two weeks later. Others pupate during the middle of August. Most of the specimens studied pupated during the last week of August and the first week of September. These emerged the following January and February when kept in the laboratory, or with the advent of warm spring weather when kept out-of-doors.

From the second to last instars all larvae are fundamentally similar with regard to pattern. Younger instars appear darker due to a relatively smaller area of light mottling. Frequently, however, one may appear lighter laterally or ventrally on account of a merging of the mottling in these areas. A description of the final instar will serve to identify the species.

Last Instar. Head height 1.25 mm.; head width 1.2 mm. General appearance of head brown. Usually yellowish with nodular rusty brown mottling (plate XIV, fig. 1). The ratio of yellow to brown varies within wide limits. At one extreme the head may possess a yellow to white background upon which is a rusty mottling. At the other extreme the head may be rusty with yellow to white mottling. The exact distribution of the mottling is also subject to change. As indicated the adfrontal areas are pronounced, extending well toward the top of the head. Setae short and transparent. Second posterior setae (P_2) near top of vertex. Second adfrontal setae (ADF_2) nearly at same level as P_1 . Anterior setae (A_1 , A_2 , A_3) form an obtuse angle. Ocelli six (plate XIV, fig. 2). Second and third ocellar lenses most prominent. Area surrounding ocelli white. Surface of head smooth.

Length of body 14 mm. Body cylindrical, more slender anteriorly. General appearance ranges from greenish yellow through yellowish green to rusty brown. Dorsal line thin, irregular, rusty and greenish white. Para-dorsal same. Outlines of both black. Background greenish with a rusty tinge where it adjoins the longitudinal lines. Lateral line at least twice as wide as the dorsal. All longitudinal lines composed of discontinuous patches of rusty white irregular in shape. Area between para-dorsal and lateral line greenish. Rusty tinge adjacent to these lines. Background ventrad of lateral line gray green. Mid-ventral line whitish, outlined with dark gray. Double para-ventral lines composed of small, irregular, disconnected patches of gray. Area between lateral and para-ventral lines gray green. Background between para-ventral and ventral lines whitish green. The dorsal line is more or less continuous; the para-dorsal, less so. The lateral line as seen with the naked eye is a wide band of irregular patches. Prolegs and anal plate rusty. Legs light greenish. Dorsal areas on the whole slightly more rusty than the rest of the body. Spiracles yellowish with dark rims, spherical to oval. Skin smooth. The arrangement of the color pattern is indicated in plate XIV, fig. 5. Body hairs or setae short, colorless. Do

PLATE XIV.



LIFE HISTORIES OF GEOMETRIDAE

not arise from sclerotizations. Abdominal setae I, III, and V in a vertical line except on the first and last segments. Seta VI extremely posterior. Seta VII unisetose on first abdominal segment, bisetose on second, and trisetose on third. Crochets biordinal. Arranged in a semicircle.

Pupa. Length 8 to 9 mm. General appearance indicated in plate XIV, fig. 7. Immediately after the last moult the pupa possesses the same markings as the larva. As these disappear with age the pupa usually becomes entirely light pea green. There may or may not be a fuscous to black dash along the edge of the wing pad. The pupa is typically flat-topped with several conspicuous ridges in the head region. These appear polished as if worn. Ivory in color. Body surface generally smooth.

***Cosymbia pendulinaria* form *nigricaria* Rothke**

As far as can be told this form differs from the foregoing one in the immature stages by color only. All other markings and habits are identical. The larvae are russet to rusty maroon in color. The pupae are pinkish.

***Nepytia canosaria* Wlk.**

In northern New England this species first appears abundantly in early spring. Eggs are laid within a few days of the first appearance. They are affixed, flattened side down, to the terminal twigs of the food plant. Large numbers were found on twigs of the food plant. Large numbers were found on twigs of various species of spruce (*Picea*). Under favorable conditions they hatch in approximately ten days, and the young larvae attack the epidermis of the spruce needles. Noticeable changes in the larvae are restricted to the color pattern which is exceedingly variable. A second and possibly a third brood may appear during the summer during which time all intermingle. The last brood of the season usually overwinters in the pupal stage. Most of the pupae observed in the field were fastened by a few strands in an upright position among and parallel to the spruce needles. Emergence occurs with the return of warm weather.

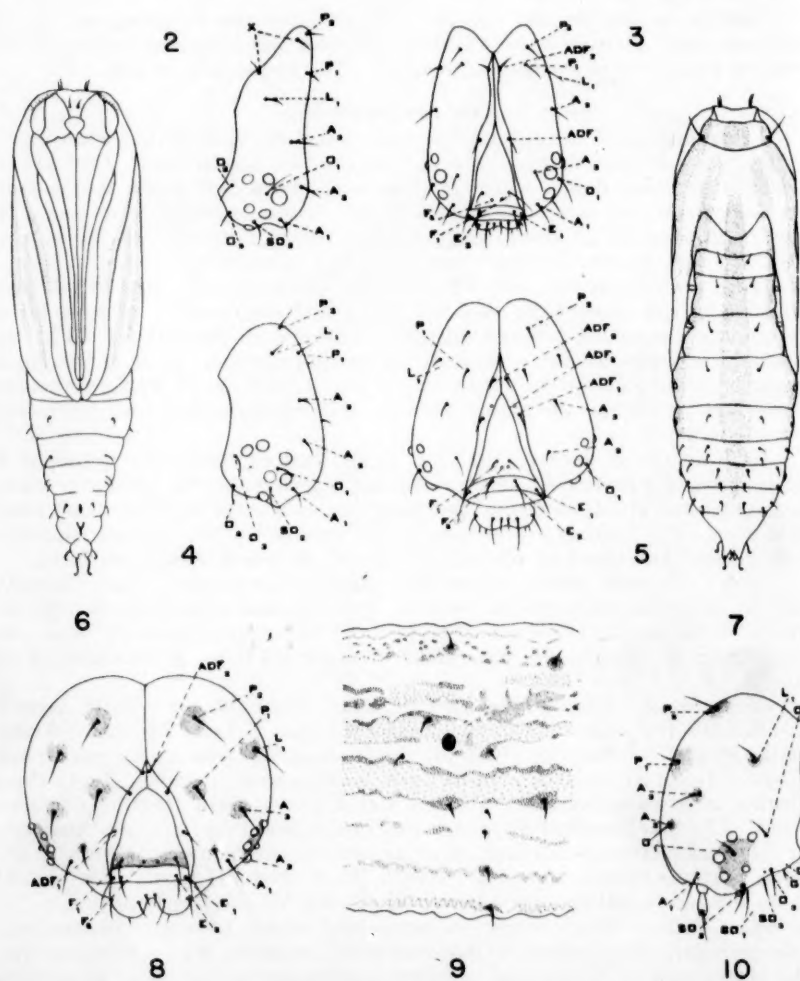
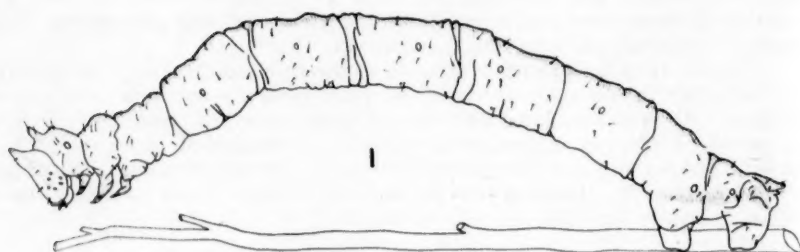
During the summer of 1941 this species was conspicuously abundant in certain parts of the state of Maine. Although spruce was the preferred plant, larvae exhibited a wide degree of independence and would feed on most native shade trees. The incidence of parasitism appeared to be low, but large numbers of larvae were consumed by birds, especially by various species of warblers.

Egg. Greenish brown, concolorous with spruce needles. Laterally compressed. Elliptical when viewed from the top. Circular when viewed from the flattened side. Generally smooth. Sculpturing microscopic, consisting of minute polygonal areas. Height .54 mm. Long diameter .40 mm. Short diameter .30 mm.

First instar. Head height .18 mm.; head width .16 mm. Head smooth, piceous, with few colorless tapering hairs. Length of body 2.5 mm. Transversely striped. Anterior half of each segment white, posterior half fuscous. Irregular fuscous supra- and substigmatal bands. Last three segments faded in appearance. All legs soiled white. Skin smooth. Spiracles fuscous. Crochets biordinal in a single row interrupted by a flap. No secondary hair. Primary setae colorless and tapering and restricted in distribution to the fuscous portions of each segment. Setae I, III, V, and VII nearly in a vertical line on the abdominal segments. Setae II, IV, and VI also nearly in line.

Last instar. Head height 1.6 mm.; head width 1.8 mm. Surface very finely granular, almost smooth. Ground color cream to gray. Markings fuscous. The extent of the markings is subject to considerable variation. Plate XIV, fig. 3 represents a typical color pattern and illustrates the arrangement of the setae. Setae colorless to light brown. Lateral seta (L_1) far back

PLATE XV.



LIFE HISTORIES OF GEOMETRIDAE

on head, equidistant from posterior setae (P_1 and P_2). Anterior setae (A_1 , A_2 , A_3) form a right angle. Second adfrontal setae (ADF_2) nearly at level of A_3 . Frontal punctures (F_a) not close together. Six ocelli well defined (plate XIV, fig. 4). Fifth remote from rest. First ocellar seta (O_1) immediately behind third ocellus. Second ocellar seta (O_2) posterior to first ocellus. Third ocellar seta (O_3) remote. Subocellar setae (SO_1 , SO_2 , SO_3) grouped in a triangle. Genal puncture (G_a) before genal seta (G_1).

Length of body 31 mm. Color pattern as shown in plate XV, fig. 9. Mid-dorsal line light orange. Para-dorsal line, at level of setae I and II, cream with border and other markings of sienna. Suprastigmal line below setae I and II suffused with yellow. Stigmal line pink. Markings fuscous. Substigmal line and ventral areas cream with pink markings. Spiracles fuscous. In general appearance the larva seems to possess a broad pinkish dorsal band with lighter and thinner para-dorsals and a darker stigmal area. Dorsal and ventral setae located in conspicuous fuscous spots. Setae I and II still retain their posterior position as in the first instar. Seta II slightly more laterad than I. Seta V slightly posterior to III and below IV. Two prespiracular setae (IV and V) on prothorax. Seta VI at the extreme posterior border of the abdominal segments. Additional setae have appeared in the ventral areas. All setae rather short.

Pupa. Length 13.2 mm. Greatest width .40 mm. Surface smooth. Few scattered colorless hairs. Ground color brownish to grayish. Markings variable, fuscous. Region of cremaster nearly black. Other features and typical color pattern illustrated in plate XIV, figs. 6 and 8.

Ellopla flscellaria Gn.

This species was not nearly so abundant as the foregoing one although the time of appearance of the two coincided. Eggs, first laid four days after emergence, are affixed flattened side down in rows on the upper surface of balsam needles (*Abies balsamea* Marshall). Egg clusters are larger with this species. Larvae emerge ten to fourteen days following oviposition. The color pattern is rather constant after the first instar.

Here also there may be as many as three broods during the summer although there is considerable overlapping. The insect usually hibernates in the pupal stage. Pupae are fastened parallel to the balsam needles by a few strands of silk.

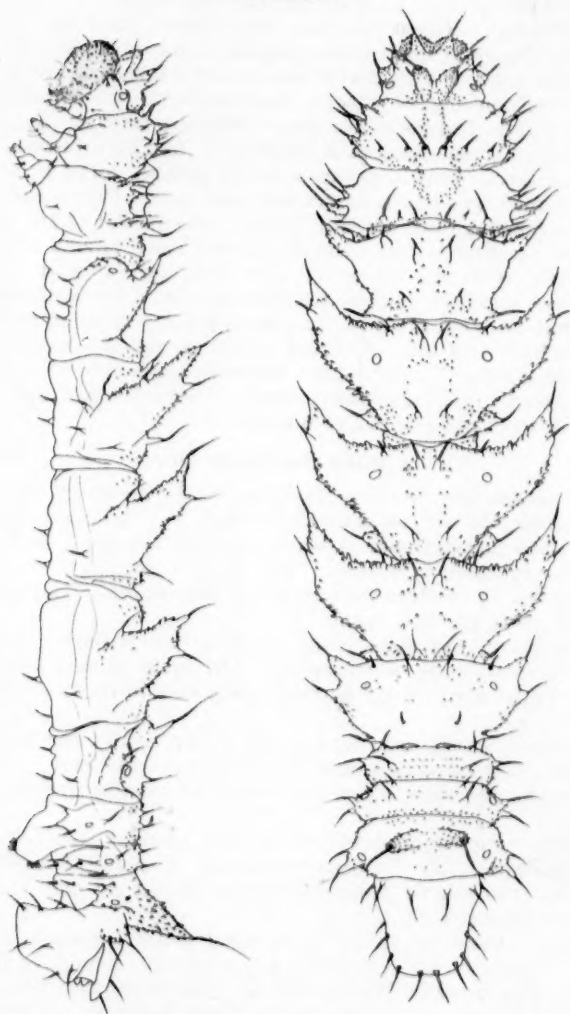
Larvae of this species appeared to be rather rigidly restricted to balsam, nor were they exceptionally numerous even on these trees. Warblers and predacious insects, especially wasps, were observed hunting and destroying numbers of larvae.

Egg. Dull green, concolorous with balsam needles. Laterally compressed. Circular when viewed from the compressed side. Generally smooth with microscopic sculpturing of minute polygonal areas. Height .46 mm. Long diameter .40 mm. Short diameter .30 mm.

First instar. Head height .18 mm.; head width .16 mm. Head smooth, almost shiny. Piceous. Hairs colorless and tapering. Length of body 1.8 mm. Ground color dark brown. Wide, brilliant white stigmal line. Thin white para-dorsals. Skin smooth. Hairs colorless and spatulate. Arrangement does not differ markedly from that of foregoing species. Spiracles concolorous with body. Crochets biordinal in a single row interrupted by a flap.

Last instar. Head height 1.6 mm.; head width 1.8 mm. Surface very finely granular, bright green. Fuscous dots conspicuous but restricted to areas surrounding the bases of the hairs. Base of clypeus sometimes suffused with fuscous. The arrangement of the setae and typical color pattern is shown in plate XV, figs. 8 and 10. First posterior setae (P_1) very far forward on head. Lateral setae (L_1) equidistant from P_1 and P_2 . Anterior setae (A_1 , A_2 , A_3) form a right

PLATE XVI.



LIFE HISTORIES OF GEOMETRIDAE

angle. A_3 nearer to P_1 than to L_1 . Second adfrontal setae at extreme tip of clypeus. A variable number of setae was found in the adfrontals between ADF_1 and ADF_2 . On many of the specimens examined the head was not bilaterally symmetrical with respect to these extra setae. Frontal punctures (F_a) fairly close together. Arrangement of ocelli, ocellar setae, and subocellar setae similar to that of the foregoing species. Genal punctures (G_a) behind genal setae (G_1).

Length of body 22 mm. Ground color green, concolorous with balsam needles. Thin white para-dorsal line through setae I and II. Wider white substigmatal line through setae IV and V. Edged dorsally with brown. Thin, white, para-ventral line below seta VI. Mid-ventral area between setae VIII of each side white, sometimes suffused with green. Spiracles black. Setae I and II still located near posterior half of segment as in first instar. Seta III anterior and above spiracle on abdominal segments. Seta IV behind and at level of spiracle. Except on the first abdominal segment seta V is nearly directly below the spiracle. Seta VI at extreme posterior border of abdominal segments. Few secondary setae in the ventral areas of the abdominal segments. Setae rather short and colorless.

Pupa. Length 10.8 mm. Greatest width 3.2 mm. Surface smooth. Few scattered hairs as shown in Plate XV, figs. 6 and 7. Ground color greenish. Faint light brown markings in the form of dorsal and para-dorsal bands and lines following the veins in the wing pads. There is little variation in the markings of the pupa though in occasional specimens the brown markings are entirely absent.

***Chlorochlamys chloroleucaria* Gn.**

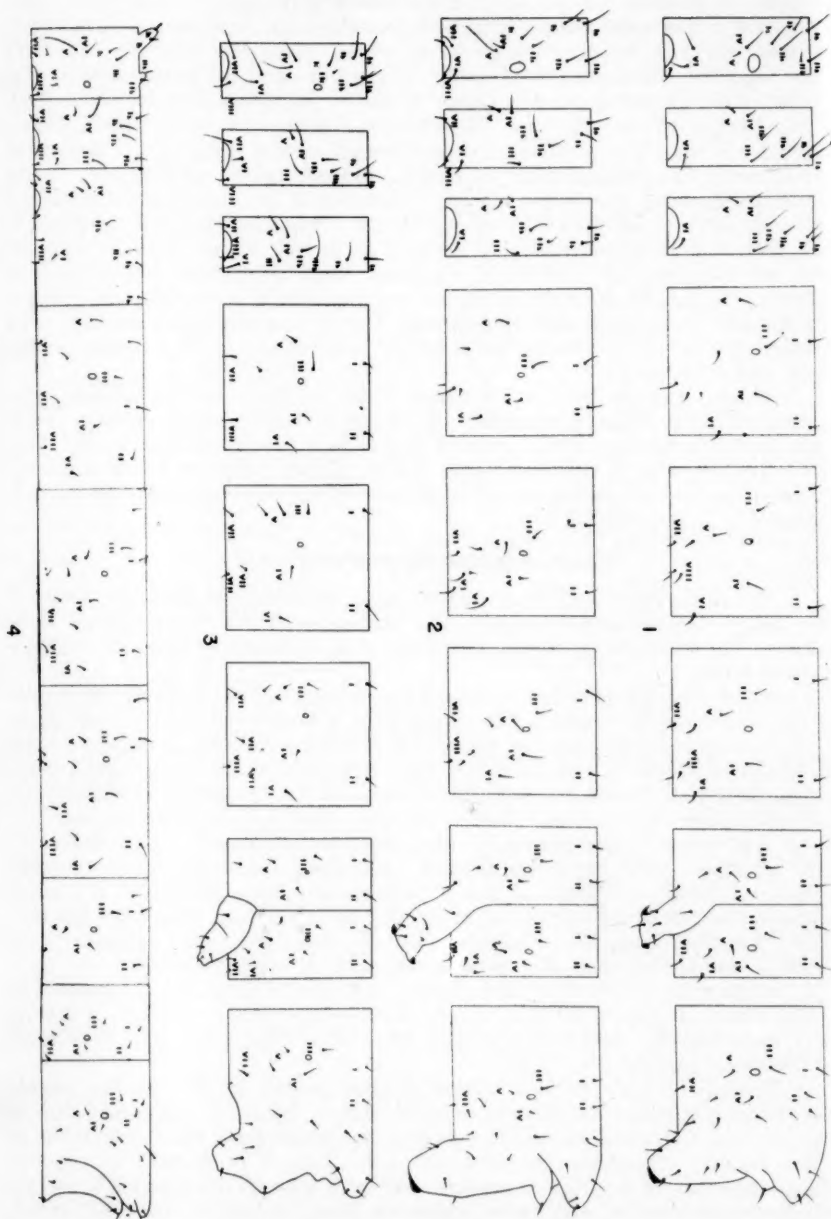
Goodell (1880) and Hulst (1880) have described the larva and pupa of this species briefly, and Comstock and Dammers (1934) have figured these stages. The description below, therefore, deals primarily with the arrangement of setae.

C. chloroleucaria is double brooded in southern New England, the second brood appearing in August. The pupal stage requires ten days. The larvae studied here fed on the leaves of *Apocynum androsaemifolium* L. and the flowers of species of *Zinnia*. The following have also been recorded as food plants: *Eupatorium perfoliatum* L., *Achillea millefolium* L., *Helenium autumnale* L., *Leucanthemum vulgare* Lam., *Helianthus* spp., *Aster* spp., and red raspberry.

Last instar. Head height 1.2 mm.; head width .93 mm. Tall and somewhat triangular with the vertex peaked. Indentation in vertex deep. Surface irregularly rugose. Light green with a suffusion of ruby at the tips of the spines and in a line from the vertex to the ocelli. Setae of head short and colorless (plate XV, figs. 2 and 3). Posterior setae (P_1 and P_2), second adfrontal setae (ADF_2), and lateral setae (L_1) grouped near top of head. Ultra-posterior setae (X) on posterior side of spine-like vertex. Anterior setae (A_1, A_2, A_3) form an obtuse angle. Ocellar setae (O_1, O_2, O_3) form a right angle. Frontal punctures (F_a) close together and below frontal setae (F_1). Six ocelli well developed, ocellus three largest.

Length of body 18 mm. General color powder green. Surface evenly covered with conspicuous sharply rounded warts. Powdery appearance due to the fact that the warts are white. Dorsal line green with faint indication of yellow borders. Sometimes suffused with red. Tips of prothoracic spines, tips of legs, substigmatal line on last segment, and spiracles ruby red (plate XV, fig. 1). Young larvae usually with more extensive areas of red in spots indicated. Crochets few in number. Biordinal, arranged in a half circle interrupted by a flap. Prothoracic setae I_a, I_b, II_a , and II_b located on large spines. Anterior spines largest. Metathoracic setae I_a, I_b, II_a , and II_b widely separated. Setae I and II of abdominal segments located on posterior two-thirds of the segments.

PLATE XVII.



LIFE HISTORIES OF GEOMETRIDAE

Seta II more laterad than I. Seta III above and slightly anterior to spiracle on all but first abdominal segment. Seta IV lower and behind. On first to fifth abdominal segments seta V is directly below III. Seta VI near posterior margin of segment. Setae short and colorless.

Pupa. Length 10 mm. Greatest width 2.5 mm. Surface smooth. Sockets of few scattered colorless hairs fuscous. General color light green to light brown.

***Nemoria rubrifrontaria* Pack.**

The very interesting larva of this species was described in a few words by Packard (1876). Its bizarre shape warrants a more detailed consideration. Larvae feed on *Comptonia asplenifolia* Ait., the leaves of which they closely resemble both in shape and coloring.

Last instar. Head height 1.6 mm.; head width 1.4 mm. Head tapering slightly toward vertex. Covered with coarse rugosities. Sienna to yellow brown. Setae short and colorless. Arranged as shown in plate XV, figs. 4 and 5. Second posterior setae (P_2) near tip. Second adfrontal setae (ADF_2) slightly below P_1 . First adfrontal setae nearer to ADF_2 than to frontal setae (F_1). Anterior setae in straight line (A_1, A_2, A_3). Six ocelli well developed. Fifth remote from rest. First ocellar seta (O_1) nearly in middle of triangle formed by ocelli 3, 4, and 6.

Length of body 15 to 20 mm. Body slightly compressed dorsoventrally. With prominent lateral projections on each segment. Those of first four abdominal segments largest (Plate XVI). Generally sienna in color. Frequently suffused with orange, yellow or green. May also be greenish, russet, yellow green, greenish brown, etc. Ventral side and intersegmental membranes usually yellowish or greenish. Lateral extensions more or less reddish brown. Spiracles concolorous with body. Rimmed with dark brown. Rough continuous substigmatal line whitish due to the presence of blunt white spines. Base of spines from which hairs arise may or may not be brilliant red. Surface of body rough, composed of many blunt spine-like projections. Only the largest are indicated in plate XVI. Crochets biordinal in a half circle interrupted by a flap. Prothoracic setae $I_a, II_a, I_b, II_b, I_c$ and II_c arise from prominent roughened reddish tubercles as indicated. Setae IV and V from less conspicuous tubercles in front of the spiracles. Setae VI bisetose. Mesothoracic setae I_a and I_b arise from dorsal tubercles. Setae II_a, II_b, III, IV , and V arise from lateral projections. Seta VI unisetose. Metathoracic setae similarly arranged. Seta II of first and fifth abdominal segments more laterad than seta I. Both are at same level on abdominal segments two to four. On abdominal segments six and seven setae I and II are both more laterad than on preceding segments. Seta I on eighth abdominal segment mounted on a very prominent spine directed posteriorly. All others directed anteriorly. Spiracles on second, third, fourth, fifth, seventh, and eighth abdominal segments are on dorsal surface. Those on remaining segments on the lateral surface. In the former cases seta III is anterior to the spiracle; in the latter, above it. Setae IV and V are at the extreme ends of the wide lateral projections. Seta VI arises from a spine of its own at the extreme posterior edge of the segment. Setae VII and VIII are in the usual positions.

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EXPLANATION OF PLATES

PLATE XIV.

- Fig. 1. Front view of the head of the mature larva of *Cosymbia pendulinaria* Gn.
 Fig. 2. Lateral view of same.
 Fig. 3. Front view of the head of the mature larva of *Nepytia canosaria* Wlk.
 Fig. 4. Lateral view of same.
 Fig. 5. Mature larva of *Cosymbia pendulinaria* Gn.
 Fig. 6. Dorsal view of the pupa of *Nepytia canosaria* Wlk.
 Fig. 7. Lateral view of the pupa of *C. pendulinaria* Gn.
 Fig. 8. Ventral view of the pupa of *N. canosaria* Wlk.

PLATE XV.

- Fig. 1. Mature larva of *Chlorochlamys chloroleucaria* Gn.
 Fig. 2. Lateral view of the head of the mature larva of same.
 Fig. 3. Front view of same.
 Fig. 4. Lateral view of the head of the mature larva of *Nemoria rubrifrontaria* Pack.
 Fig. 5. Front view of same.
 Fig. 6. Ventral view of the pupa of *Eltopia fiscellaria* Gn.
 Fig. 7. Dorsal view of same.
 Fig. 8. Front view of the head of the mature larva of same.
 Fig. 9. Typical abdominal segment of *N. canosaria* Wlk. to show color pattern.
 Fig. 10. Lateral view of the head of the mature larva of *E. fiscellaria* Gn.

PLATE XVI.

Dorsal and lateral views of the fully grown larva of *N. rubrifrontaria* Pack. showing the arrangement of the setae.

PLATE XVII.

- Fig. 1. Map of the body setae of the mature larva of *N. canosaria* Wlk.
 Fig. 2. Same for *E. fiscellaria* Gn.
 Fig. 3. Same for *C. pendulinaria* Gn.
 Fig. 4. Same for *C. chloroleucaria* Gn.

In each case the three thoracic and the first, second, third, sixth, seventh, and eighth abdominal segments are shown.

A NEW CANADIAN SPECIES OF *ASPHRAGIS* (HYMENOPTERA, ICHNEUMONIDAE) *

BY G. STUART WALLEY,

Ottawa, Ont.

In 1925 Cushman (Jl. Wash. Acad. Sci., XV, 392) transferred *Meniscus mirabilis* Cress. to the genus *Asphragis*, and synonymized with it *Asphragis pulcherrimus* Ashm., *Clistopyga pleuralis* Ashm. and *Meniscus ostentator* Davis. Up to the present this species has constituted the only representative of the genus reported from the United States and Canada.

The National Collection contains a series of *mirabilis* from various Canadian localities, ranging from the Maritime provinces to British Columbia. This series exhibits the usual variations in color characteristic of the species.

A second species is represented in our collections by three specimens taken at Canim Lake, B. C., by the late J. Kenneth Jacob. I take pleasure in naming this species in honor of Mr. Jacob, whose collections of British Columbia insects have proved such a valuable addition to the National Collection.

Asphragis jacobii n. sp.

This species agrees with *Asphragis mirabilis* (Cress.) in the entire absence of an areolet and the general shining appearance of the body, especially the head and dorsum of the thorax. It differs markedly from *mirabilis* in its much smaller size, much shorter and broader radial cell, and the differently maculate body and legs, also in details of sculpture of the propodeum and abdomen.

*Contribution No. 2197, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

Female. Length 4.5 mm., antennae 4 mm., ovipositor sheath 3.5 mm. Head transverse, a little wider than thorax; temples rounded and strongly receding; face twice as wide as length at middle from base of clypeus to antennal foramen; clypeus strongly convex, rather sharply discreted; malar space slightly less than basal width of mandible; cheeks convex; ocelli small; postocellar line almost twice diameter of an ocellus and equal to ocell-ocular line; antenna 28-segmented, scape only moderately excised; head shining, with only a few microscopic punctures on face and clypeus; cheeks, malar space, frons, and vertex in the region of and including the ocellar triangle, with fine alutaceous sculpture, remainder of vertex and temples polished.

Thorax shining; pronotum mostly smooth, with a few fine scattered punctures; mesoscutum impunctate, shining, wholly smooth except for faint reticulate shagreening on anterior portion; scutellum polished; mesopleura polished, finely sparsely punctate; metapleura a little more densely punctate; propodeum shining, with a well defined apical transverse carina and a slight indication of a pair of median longitudinal carinae, the latter interrupted and confused by the general sculpture of the area, which consists of very fine irregular and often obsolescent transverse rugulae and a few obscure punctures; pleural carina distinct and complete; spiracle small, circular.

Radial cell short, three-fourths as broad as distance from tip of stigma to apex of radial cell measured along metacarpus; first and second abscissae of radius forming an angle of about 100 degrees; nervulus slightly postfurcal; subdiscoideus below middle of first brachial cell; nervellus perpendicular, broken far below middle.

Legs long, slender, tarsal claws with 3 or 4 distinct teeth.

Abdomen a little longer than head and thorax combined, moderately shining, first three tergites and base of fourth tergite with distinct sculpture; first tergite narrowly sessile at base, almost two-thirds as broad at apex as long, convex, with a pair of short carinae extending a little beyond spiracles, surface finely roughened and with numerous fine somewhat irregular longitudinal rugulae; second tergite slightly broader at apex than long, with a shallow transverse subapical impression, sculpture as in first tergite but a little finer and absent on narrow apical margin; third tergite finely granular-rugulose, smooth at apex; fourth tergite only feebly sculptured at base, with a broad smooth apical margin.

Body black, paler as follows: spot on scape and pedicel below, face (except for 3 fused spots, one median and one on either side, forming a trilobed transverse bar immediately below antennae) clypeus, mandibles except teeth, malar space, gena, anterior orbit expanding into a broad spot at summit of eye, angulate spot on centre of mesoscutum, scutellum, tegula, a minute spot before and another below tegula, broad longitudinal stripe on mesopleura below, front and middle coxae entirely and all except inner surface of hind coxa, yellow; palpi, propleura and adjacent portion of pronotal collar, yellowish with fuscous staining; legs reddish, the front and middle trochanters and apical segment of hind trochanter somewhat paler in front, hind tibia with a broad suffused fuscous band narrowly separated from base, and another at apex; hind tarsus dark brown, the front and middle tarsi paler brownish; stigma and veins brown, extreme base of wing yellow; narrow apical margin of second abdominal tergite brownish, the polished apices of the following tergites very narrowly and obscurely paler.

Male. Length 4 mm. General structure and appearance as in female; first three tergites of abdomen with fine reticulate alutaceous sculpture. Color as in female but paler markings more extensive, the face entirely yellow, the mesoscutal spot larger and joined by narrow lines indicating position of notaulices to the anterior end of a broad marginal stripe on mesoscutum before tegula; mesopleural stripe very broad and continuous with the broadly yellow

pronotal collar; metapleuron with a yellowish spot; second tergite yellow on the narrowly impressed basal portion, also narrowly yellow at apex, as is also the third tergite, the latter also with a distinct narrow yellow basal band; lateral margins of the posterior tergites and genital claspers brownish.

Holotype—♀, Canim Lake, B. C., June 22, 1938, (J. K. Jacob); No. 5361 in the Canadian National Collection, Ottawa, Ont.

Allotype—♂, same data as holotype.

Paratype—♀, same data as holotype. Deposited in the United States National Museum.

Notes—The paratype differs from the above description of the holotype in its slightly larger size (length 5 mm.), 29-segmented antenna, and in having the abdominal tergites with somewhat different sculpture, the first and second tergites with fewer and more irregular rugulae, the second tergite largely finely granular-reticulate at base and the third almost entirely so. In the paratype the mesoscutal spot is divided into two triangles, and there is a narrow yellow marginal stripe on the mesoscutum before the tegula.

NOTE

A SIMPLE METHOD FOR USE IN STAINING LIVING APHIDS

One of the difficulties encountered in most attempts at staining living aphids has been injury to the insect in trying to remove it from the host plant or by application of the staining material. In connection with the indoor rearing of the aphid *Myzus persicae* Sulzer in winter on potted turnip plants kept on the laboratory table, it was found possible to overcome both of these difficulties and to stain aphids at the rate of 300 per hour with very simple apparatus.

The winged aphids developed in crowded colonies on the turnip sprouts were found to be positively phototropic and to fly at once to the nearest window where they gathered in large numbers. When gently stirred with a camel's hair brush, they formed clusters in much the same way as swarming bees and such clusters, a centimeter in diameter, could easily be moved to a staining apparatus.

The staining apparatus was made up of very simple materials, a glass tube 10 inches long and one inch in diameter with a test tube brush to fit neatly inside. The bristles of the brush were thoroughly coated with a finely powdered dry stain by rolling it in a dish of the stain before inserting it in the tube. The brush was adjusted in the centre of the tube and cotton plugs provided for each end of the tube. In use the winged aphids in lots of approximately 300 were placed in one end of the tube which was then covered with a strip of wrapping paper loosely rolled about the tube and held in place with a rubber band. This was to exclude light. The uncovered end of the tube was directed towards a window, and the aphids, in crawling through the stain-bearing bristles of the brush, coated themselves very thoroughly on body, legs, wings and antennae.

A variety of dry stains were tried. Synthetic ultramarine was found a satisfactory blue, powdered carmine a good bright red, iron oxide a dark red. The metallic aluminium powder and bronze powder gave interesting colors but had an injurious effect on the insect when exposed to strong sunlight.

Several shipments of the stained aphids were sent to distant points: Ottawa, Brandon, Manitoba, and Agassiz, B. C., and on return were still healthy and able to reproduce. On plants out-of-doors, the colored aphids could be detected after two weeks exposure.

R. P. Gorham,
Fredericton, N. B.

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p. 33, line 2. For "*eurytheme* f. *eriphle* Edw. Gen. Dist.", read:

eurytheme ab. ♀ *alba* Stkr. Tr., VB., Wg., Ft.A., Beu., Bir.

p. 33, line 41. For "*uhleri varuna* tr. f. *dennisi* Gund. Beulah" (which is repeated in the following line), read: *uhleri varuna* Edw. Aw., Beu., Bir.

p. 33, line 48. For "*theano canadensis* f. ♀ *churchillensis* Warr. Ch." (which is repeated in the following line), read: *theano canadensis* Warr. Ch.

p. 34, insert following line 5: *aphrodite cypris* ab. *mayae* Gund. Kelwood.

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